



Exploring geochemical variability within Lateglacial Italian tephra; seeking new tools for characterisation and correlation.

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Tephrochronology is widely used within Quaternary environmental and archaeological studies to provide absolute dates, allow direct correlation between records, test existing chronologies, and build independent age models. Recent developments have enabled tephra deposits invisible to the naked eye to be extracted from locations thousands of kilometers from the volcanic source, providing widespread event horizons able to tie together very distal chronologies. Tephrochronology is now seen as playing a key role in understanding and timing past climatic and environmental changes (Lowe, 2001). The extension of Quaternary tephrochronologies beyond proximal volcanic regions relies upon the accurate identification of this far-travelled volcanic ash. At these extreme distances, ashes are generally depleted in characteristic mineralogical components, reducing the scope for characterisation and comparison with well-defined proximal deposits. In such situations identification typically relies solely upon the major and minor element composition of the vitreous ash fraction. However, the idea that major and minor element compositions alone can provide a unique fingerprint for every individual eruption is now widely challenged by the frequent discovery of multiple tephra deposits displaying apparently indistinguishable compositions (e.g.: Wulf *et al.*, 2007).

If robust proximal to distal tephra correlations are to be made and tephrochronologies extended, there is a need for improved and extended analytical methodologies.

Furthermore, it is essential to understand how transport over increasing distances can affect the physical and chemical characteristics of a tephra layer. This paper explores aspects of the variability of tephra geochemistry, by looking at both major/minor element compositions and further methods of characterisation, including trace element analyses. A suite of Lateglacial Italian volcanic ash fall deposits has been studied within a number of terrestrial and marine sites in an attempt to explore the variability observed both within and between eruption deposits and to address the characterisation of “apparently indistinguishable” tephra layers.

References:

J.J. Lowe, 2001. Abrupt climatic changes in Europe during the last glacial-interglacial transition: the potential for testing hypotheses on the synchronicity of climatic events using tephrochronology. *Global and Planetary Change*, 603, 73-84.

S. Wulf, M. Kraml and J. Keller, 2007. Towards a detailed distal tephrostratigraphy in the Central Mediterranean: the last 20,000 yrs record of Lago Grande di Monticchio. *Journal of Volcanology and Geothermal Research*, In Press, Accepted Manuscript.